Milken Institute

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Addressing California's Pension Shortfalls

The Role of Demographics in Designing Solutions

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EXECUTIVE SUMMARY

California's state pension shortfall has recently grabbed the headlines. It's a staggering sum that has unnerved politicians and the public alike. In April 2010, Gov. Schwarzenegger warned the state of what comes next if the funding gap remains unsolved: "The consequences are clear: increasingly large portions of state funding for programs Californians hold dear such as schools, parks and health care will be diverted to pay for this debt."[1]

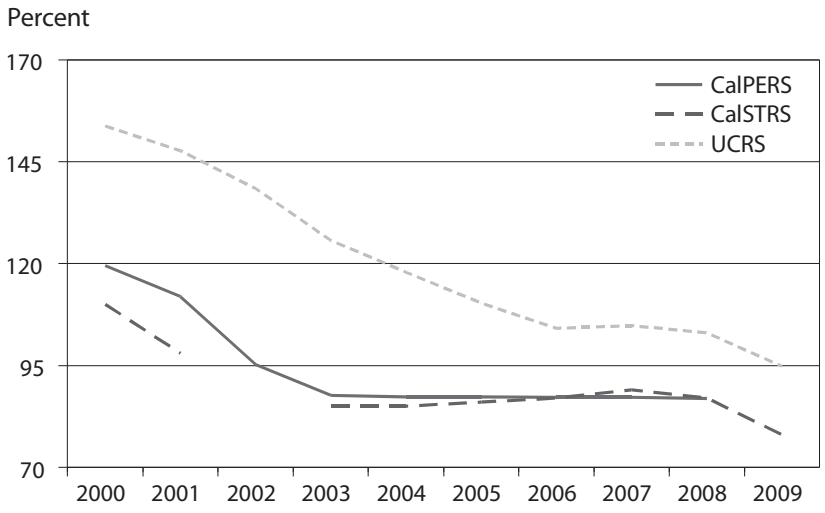
California's government serves as a de facto guarantor for state pension obligations. State taxpayers are therefore on the hook to service the potential debt in the years to come. In view of the current state budget crisis and the lack of public appetite for tax hikes, there are few options left besides cutting public services and programs once these unfunded liabilities come due. But the demographic trends at work in California seem to suggest an undiminished, if not increasing, demand for publicly provided goods and services. Moreover, the make-up of the state workforce itself is projected to further drive up pension liabilities. Any viable solutions to make the state's public pension plans more sustainable have to account for these demographic factors.

California has the largest state pension systems in the nation. Its three major pension funds—administered respectively by the California Public Employees' Retirement System (CalPERS), the California State Teachers' Retirement System (CalSTRS), and the University of California Retirement System (UCRS)—have experienced deteriorating funding status over the last decade. Their asset values have shrunk significantly relative to the growing size of their pension liabilities, resulting in sinking funded ratios. In fiscal year (FY) 2007–2008, the combined unfunded obligation accumulated to $57.57 billion for CalPERS and CalSTRS, or a funding gap worth 15 percent of their total assets.[2] Moreover, during the market declines that accompanied the recent financial crisis and the ensuing recession, all three funds saw their worst investment returns since the 1990s. UCRS also began to accrue unfunded obligations, which amounted to 5.5 percent of its assets in FY 2008–2009; meanwhile, CalSTRS' unfunded liability degenerated to 28 percent of its assets.[3]

1. Press release from the Office of the Governor (April 5, 2010) http://gov.ca.gov/press-release/14745/.
2. The funds' assets are reported on an actuarial basis, as opposed to their market values. The actuarial value smooths out the effects of market volatility over years. Hence, it is usually lower than the market value of assets during boom times and higher during market downturns.
3. The funding status of CalPERS also experienced further deterioration that year, but the updated actuarial numbers had not been released as we went to press. However, its market-value-based funded ratios declined by 25–30 percent from FY 2007–2008 to FY 2008–2009 (see "Facts at a Glance: General" released by CalPERS in September 2010), whereas the corresponding decline for CalSTRS was 27 percent.

Funded ratio

Actuarial basis, FY 2000-2009*



* The 2002 figure is not available for CalSTRS. The 2009 figure is not available for CalPERS, whose most recent actuarial valuation published was conducted on June 30, 2008.

Sources: CalPERS, CalSTRS, and UCRS.

While recent investment losses have prompted concerns about the funds' investment strategies and risk management, many reports and studies question the funds' accounting practices, which can underestimate pension liabilities. Multiple observers have contested the size of the state's pension liabilities and warned that they are much bigger than officially reported. A 2010 study prepared for the governor by graduate students at Stanford University re-estimated the size of the gap and found that it exceeded *$425 billion*.

The source of the discrepancy lies in the particular discount rate adopted, which determines future pension obligations in today's value. Many argue that a more conservative rate of return should have been assumed. Because the retirees have been promised a defined-benefit plan, they are contractually guaranteed a fixed pension payment *regardless of the funds' investment performances*, thus creating the potential for an insurmountable funding shortfall if investments decline sharply, as they did during the market meltdown.

Besides the obvious concerns about the funds' financials, there are also important structural factors at work, mostly related to demographics. They will affect not only the demand for public services (and the ability to absorb cuts to these services) but also the state's fiscal capacity to guarantee public pension payments.

Based on our analysis:

- From 2000 to 2050, the aging of California's population will accelerate. The size of the senior population is expected to more than triple, from 3.6 million in 2000 to 11.6 million in 2050. During this period, seniors will grow from accounting for less than 11 percent of the state's population to nearly 20 percent. This will have a profound fiscal impact on the state-run programs that serve senior citizens.

- At the same time, the working-age population, the heart of the tax base, will increase steadily in terms of its size, but its share of the total population will shrink from around 60 percent to 54 percent, implying a lower support ratio per senior.

- The number of California's school-age children will slowly increase at an annual rate well below 1 percent. However, changes in the *composition* of this population group may indicate increasing public school enrollment, thus mandating the allocation of more state funds to K-14 education and making cuts untenable.

- Improved longevity will result in more benefit-receiving years than pension-contributing years for state employees. If the average retirement age remains unchanged, pension liabilities will proliferate without commensurate increases in the pension contributions that prefund future benefit payments.

- The age make-up of state employees will eventually bring down sharply the ratio of active (and thus pension-contributing) members to total benefit recipients, which has already been declining. If state pensions remain underfunded or if there are future shortfalls, raising employee contributions alone will have a less and less mitigating effect.

- According to our crude projections, if no corrective actions are taken, *the combined liability of the three major state pension funds will be more than 5.5 times as large as total state tax revenue around 2012–2013*. Moreover, the combined liability per each working-age adult in California is projected to more than triple, from $3,000+ in 2009 to over $10,000 in 2014.

It's no secret that the state of California lacks the resources to make huge infusions into state pension funds. The state government is trapped in its own budget crisis at least in the short run, and future expenditures for public services and programs are expected to rise simply to keep up with demographic trends in the short- to medium-term. Moreover, the composition of the state employee pool suggests that state pension liabilities will only grow larger in the forseeable future. Given these realities, prompt action is urgently needed to restructure our state pension system. Otherwise, the burden facing future state taxpayers will rapidly escalate. Avoiding the issue today will only make it grow in magnitude tomorrow.

We put forward two sets of solutions to address the demographic challenges faced by California state pension funds. The first policy option is **making adjustments to the traditional defined-benefit plan by *concurrently* raising the retirement age and increasing employee contributions**.

Raising the retirement age will create more pension-contributing years and fewer benefit-receiving years. However, it is important to note that delaying retirement alone may not necessarily yield the highest financial savings in the long term. Years of service and final salary are both multipliers in the current pension formulas, so a longer tenure can bring with it a more-than-proportionate increase in an employee's pension benefit. To make a real dent, a higher retirement age needs to be implemented *jointly* with increased employee contribution to ensure that future benefits are better pre-funded today.

In 2010, Gov. Schwarzenegger announced deals with seven unions to temporarily roll back pension benefits, including adjustments to both the retirement age and contribution levels. The most recent announcement came in early October, as the SEIU struck an agreement that included these provisions, plus furlough days. (As of press time, this latest deal had not yet been ratified by the union membership or the legislature, though the first six have been signed into law.) This development is a step in the right direction, proving that compromise is indeed possible. But while these agreements cover 132,000 employees, they constitute only around 16 percent of CalPERS' active membership. These deals, which cover only the next contract period, will chip away at the problem, but it will take more fundamental changes and continued momentum to adequately address the funding gap.

Changing the terms but keeping the same basic plan in place is an approach that may have to be periodically revisited as time goes on. But even if these types of changes are again warranted in the future due to demographic trends, it is usually difficult to convince stakeholders to implement them when the market is enjoying an upturn and pension funds enjoy substantial windfalls. In order to achieve a more lasting and effective pension overhaul, it will eventually be necessary to **shift to a risk-sharing retirement plan**.

Generally, this type of plan, similar to a defined-benefit plan, guarantees a basic pension benefit or a minimum rate of return to pension contributions that are risk-free to the employees. But it does ask the employees to bear the investment risks for *part* of their future benefit in the same fashion as a defined-contribution plan, such as a 401(K).

This solution has a number of advantages. On the one hand, it reduces the asymmetry between the risk of fund investments and the certainty of pension payments, thus decreasing the likelihood of a crushing pension liability. On the other hand, it still provides a fixed (though lower) amount of guaranteed pension, which is an important recruiting tool for the state. It should be possible to reduce state liability while still offering a good degree of retirement security for public servants.

These changes are more sweeping than simply making a technical fix to the pension funds' financing. They will involve a great deal of political wrestling. It will take will and courage from both legislators and union leaders, as well as broad public support, to make such changes a reality. But a swift and equitable resolution for the pension crisis is urgently needed so that the state can put its budget in order and prioritize expenditures on the services and investments that Californians deserve.

CALIFORNIA STATE PENSION FUNDS AND THEIR UNFUNDED LIABILITIES

In early 2010, the Pew Center on the States issued a report with an alarming finding: The funding shortfall for state retirement systems across the nation has hit an astronomical $1 trillion. Even more sobering, this figure is based on financial reports filed at the end of fiscal year 2008, so it doesn't reflect the full effects of the deepest recession in recent history.

Having one of the largest retirement systems in the nation, the state of California is facing one of the nation's biggest funding gaps. Its daunting unfunded pension liabilities made national headlines in April 2010, when a study prepared for Gov. Schwarzenegger by graduate students at Stanford University re-estimated the size of the gap and found that it exceeded $425 billion (Bornstein et al. 2010). The governor sounded a warning that paying off future pension debts may require catastrophic cuts in other programs and services.

The Stanford report investigated the funding status of the three largest state pension systems: the California Public Employees' Retirement System (CalPERS), the California State Teachers' Retirement System (CalSTRS), and the University of California Retirement System (UCRS). Each system administers a variety of investment funds, but their primary funds—the Public Employees' Retirement Fund (PERF), the State Teachers' Retirement Plan (STRP), and the University of California Retirement Plan (UCRP)[4] —all offer defined-benefit pension plans, which guarantee a fixed pension payment for every retired employee *regardless of the funds' investment performances*.[5]

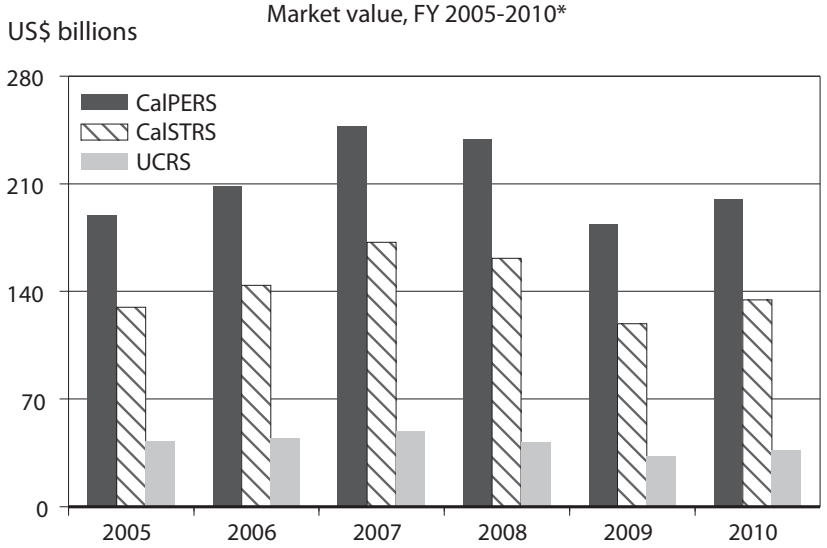
4. Throughout this report, unless noted otherwise, the parent system's name is used to refer to each primary fund.

5. For all plan members, defined-contribution plans are also available to supplement their pension benefits.

Figure 1 shows the market value of these three funds' total investments. All three saw their assets shrink during the 2008-2009 recession, but recouped part of their losses by 2010, when the market value of their assets totaled $371 billion.[6]

Figure 1. Total investment fund

Market value, FY 2005-2010*



* The figures account for all funds administered by the three retirement systems. The 2010 figure for UCRS is as of December 2009.

Sources: CalPERS, CalSTRS, and UCRS.

The nature of the defined-benefit plan necessitates a set of actuarial assumptions and methods, such as asset smoothing, discounting future payment obligations, amortization of pension liabilities, and the like. Recently, however, these assumptions have become a flashpoint in the heated pension debate. Many studies and reports argue that the discount rates assumed by California's three major pension funds are overly high, leading to a serious underestimation of their actuarial liabilities.

Take the Stanford report, for example. Its estimate results from adopting a discount rate of 4.14 percent, or the 10-year yield of Treasury Inflation-Protected Securities, instead of relying on the rates derived by the pension funds themselves from their average annual investment returns (7.75 percent for CalPERS, 8 percent for CalSTRS, and 7.5 percent for UCRS[7]). The reasoning behind using a more conservative set of assumptions is best stated by two finance scholars, Robert Novy-Mark and Joshua D. Rauh, who wrote in their 2009 study:

> *[...] the magnitude of pension liabilities and how a pension's funds are invested are two separate issues that should be considered independently. In practice, the accounting standard being used sets up a false equivalence between pension payments, which are extremely likely to be made, and the much less certain outcome of a risky investment portfolio.*

The authors also argue that "[a] state defined-benefit pension plan serves the purpose of delivering a contractually pre-specified annuity for the state employees, with taxpayers on the hook for shortfalls."

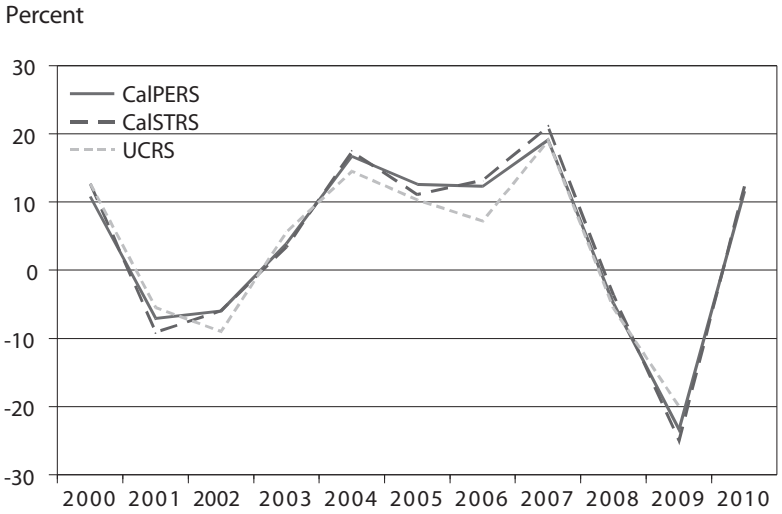
6. These figures are for the fiscal year ending June 2010 for CalPERS and CalSTRS. UCRS numbers are as of December 2009.

7. While these assumed average rates of returns do in fact match historical performance, there has been a great deal of debate about whether they should have been set lower to allow for the possibility of market volatility such as we have experienced in recent years. See http://www.calpers.ca.gov/eip-docs/about/board-cal-agenda/agendas/bpac/201008/item03e-0.pdf for CalPERS' response to these criticisms.

Figure 2 documents the annual rate of return over the last decade for CalPERS, CalSTRS, and UCRS, respectively. It shows very similar patterns across all three funds, largely reflecting market volatility. Even before the recession hit in 2008, however, it is interesting to note that multi-year positive investment returns did not seem to bring down the pension funds' unfunded liabilities, which started to accumulate at the beginning of the last decade for CalPERS and CalSTRS, as shown in figure 3. The UCRS funding surplus also diminished over time, and eventually, in 2009, it became a shortfall as well.

Figure 2. Rate of return for fund investments

FY 2000-2010*

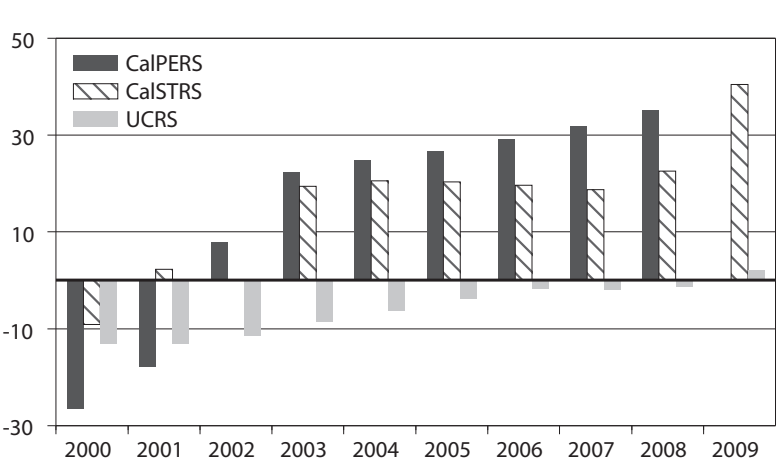


* The figures account for all funds administered by the three retirement systems. The 2002 rate is gross of fees for CalPERS. The 2010 rate is unavailable for UCRS.

Sources: CalPERS, CalSTRS, and UCRS.

Figure 3. Actuarial unfunded accrued liabilities

FY 2000-2009*



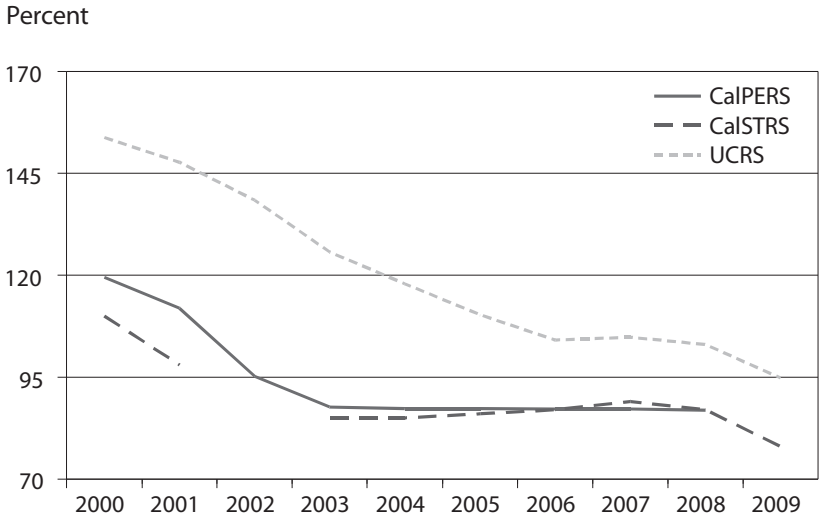
* The 2002 figure is not available for CalSTRS. The 2009 figure is not available for CalPERS, whose most recent actuarial valuation published was conducted on June 30, 2008.

Sources: CalPERS, CalSTRS, and UCRS.

Figure 4 reports the funded ratio (i.e., the ratio of actuarial value of assets to actuarial accrued liability) of each of the three pension funds. Here it is even more obvious that the funding status of California state pension funds had been deteriorating over the last decade. It is not simply a phenomenon created by the financial crisis and the recession. In fact, if a lower discount rate had been adopted to assess the funding status, the whole picture would have turned even bleaker.

Figure 4. Funded ratio

Actuarial basis, FY 2000-2009*



* The 2002 figure is not available for CalSTRS. The 2009 figure is not available for CalPERS, whose most recent actuarial valuation published was conducted on June 30, 2008.

Sources: CalPERS, CalSTRS, and UCRS.

While accounting practices are extremely important in determining the real magnitude of current liabilities, structural factors—most notably demography—are also crucial in assessing the long-term financial viability of the state pension funds. These factors likely contributed to the mismatch between positive investment returns and the continuing growth of unfunded liabilities that was already becoming apparent before the financial crisis took hold in 2008. On one hand, the demographic profile of the state workforce and its retirees are part of the actuarial assumptions that have to be made in order to form a comprehensive assessment of future pension obligations. But demographics play an even broader role in the issue: California's general population trends and its fiscal capacity also affect the feasibility of diverting state resources into servicing the state's potential pension debt.

Rather than focusing on the accounting issues and potential short-term fixes, this paper focuses on the demographic side of the equation to identify long-term solutions. If implemented, these changes will be more likely to get the taxpayers off the hook without drastic measures such as slashing the state workforce or cutting vital state services demanded by the general public, two alternatives that will produce short-term financial savings but undesirable and long-lasting consequences for the state's broader economy.

DEMOGRAPHIC TRENDS, DEMAND FOR PUBLIC SERVICES, AND THE STATE'S FISCAL CAPACITY

Following the release of the Stanford report, Gov. Schwarzenegger issued a statement: "The consequences [of staggering state pension debt] are clear: increasingly large portions of state funding for programs Californians hold dear such as schools, parks and health care will be diverted to pay for this debt."[8] California's demographic trends imply a growing aggregate demand for public services and programs. If the overwhelming public pension liabilities are not tackled promptly, they will not only increase taxpayers' burden in the forseeable future—they will also seriously erode the state's ability to serve its population and deliver a good quality of life.

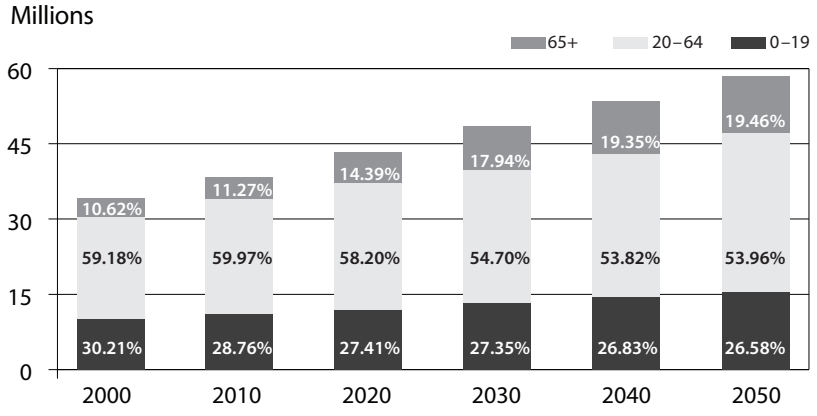
The Workforce Is Growing, But Not as Fast as the Senior Population

Medical advances are producing increased longevity. But that good news does pose some societal challenges that call for serious planning, and California is no exception.

Figure 5 presents population projections for California up to the year 2050. Working-age adults (ages 20–64)[9] constitute the majority of the tax base, and their numbers are expected to increase steadily over the next couple of decades. But over time they will account for a smaller share of the total population, dropping from around 60 percent to 54 percent over the first half of the 21st century. The driver behind this trend is the even faster-growing senior segment, which accounted for less than 11 percent of the population in 2000 but will make up nearly 20 percent in 2050. The absolute size of this age cohort will more than triple.

Figure 5. California Population Projections

2000-2050



Sources: California Department of Finance.

8. "Governor Schwarzenegger Issues Statement on Stanford Pension Report," press release from the Office of the Governor, April 5, 2010, http://gov.ca.gov/press-release/ 14745/.

9. The lower age cutoff for working-age adults is normally 18 years old. However, since the data provide population counts in age groups of five years (e.g., 0-4, 5-9, and so forth), we set the lower cutoff at 20.

This has profound implications on the potential demand for several of the state's public services—in particular, Medi-Cal, the public health insurance program, as well as Supplemental Security Income/State Supplementary Payment (SSI/SSP), both of which serve low-income seniors. According to projections from the Legislative Analyst's Office in "California's Fiscal Outlook," the combined expenditures of these two programs amounted to $14.73 billion in FY 2009–2010 and will grow to $22.66 billion in a matter of just five years (moving from 16.51 percent to 18.27 percent of total general fund spending). One of the main factors behind this projected expenditure increase is the caseload growth that can be expected with an aging population.

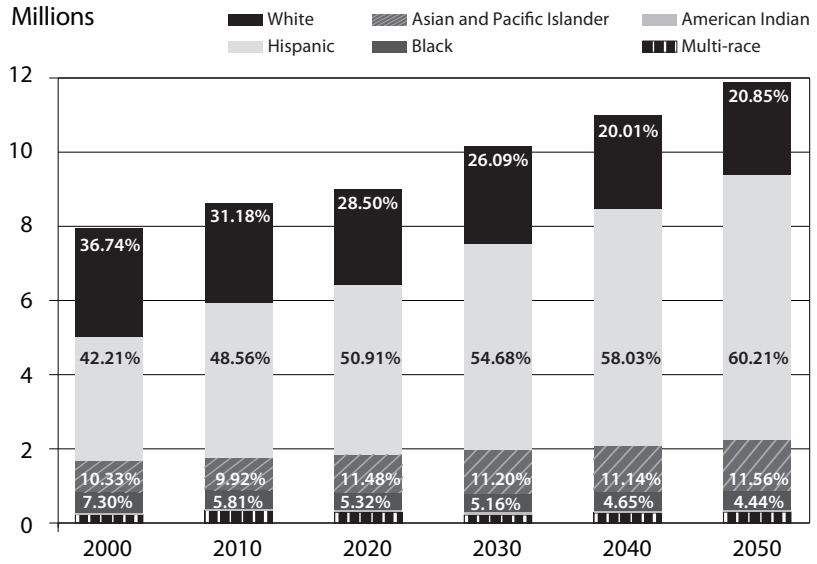
School-Age Population and the Demand for Public Education

The annual population growth rates for seniors and working-age adults in California are expected to average 2.68 percent and 0.98 percent, respectively, between 2000 and 2050. By contrast, the state's youngest population is projected to increase at a lower rate of 0.90 percent. Nevertheless, potential changes in the *composition* of the school-age population may significantly impact the demand for public education, in particular for K-12 schools and California Community Colleges.

Figure 6 shows population projections for 5- to 19-year-olds in California by race/ethnicity, and it is clear that the number of Hispanic youngsters is set to grow rapidly. Their population size is expected to more than double, accounting for slightly more than 60 percent of the total school-age segment in 2050 (compared with 42.21 percent in 2000). Based on census data for years 1990 and 2000, Hispanic students have the highest public school enrollment rate along with American Indians; their enrollment is more than 4 percentage points higher than the average. This pattern persists across all school-age groups (see Table 1).

Figure 6. California population projections, Ages 5 - 19

By race/ethnicity, 2000-2050



Sources: California Department of Finance.

Table 1. California Public School Enrollment Rates (1990 and 2000)					
Year	**Race/Ethnicity**	**Age 5-9**	**Age 10-14**	**Age 15-19**	**Age 5-19**
1990	White	83.17%	88.37%	88.67%	86.57%
	Hispanic	92.95%	93.73%	94.09%	93.55%
	Asian and Pacific Islander	83.75%	90.55%	92.09%	88.72%
	Black	87.11%	91.78%	93.44%	90.52%
	American Indian	91.36%	93.29%	95.07%	93.16%
	Other race	80.00%	91.30%	93.10%	87.83%
	All	**86.88%**	**90.72%**	**91.20%**	**89.47%**
2000	White	79.67%	85.57%	87.69%	84.26%
	Hispanic	94.30%	94.77%	93.94%	94.37%
	Asian and Pacific Islander	84.27%	89.54%	90.73%	88.26%
	Black	87.72%	92.08%	91.62%	90.41%
	American Indian	93.37%	96.77%	96.85%	95.55%
	Multi-race	81.69%	87.42%	89.87%	85.90%
	Other race	80.70%	85.25%	89.36%	84.85%
	All	**87.50%**	**90.35%**	**90.77%**	**89.43%**

Source: U.S. Census.

There are a variety of factors that explain these higher enrollment rates. Some studies in the economic literature point out that differences in public school enrollment rates may be related to citizenship status (Betts and Fairlie 2003, for example). But whatever the cause, if historical patterns continue to hold, the projected composition of California's future school-age population portends increasing demand for the state's public schools. This growth will then require more state resources devoted to funding K-14 education, as mandated by Proposition 98.

At present, public education accounts for the lion's share of the state's general fund spending. In FY 2009–2010, it constituted approximately 47 percent of total spending, with the vast majority allocated to support K-14. With the mandatory level of K-14 funding set by law, any short-term effort to cut education spending may turn out to be inconsequential. Furthermore, the demographic trends at work indicate that demand for public education is not likely to diminish in the near future. In order to continue cultivating the state's human capital and to maintain its long-term competitiveness, California's government simply cannot risk letting this demand go unmet by diverting resources intended for education into funding to cover state pension shortfalls.

Demographic Analysis of State Employees

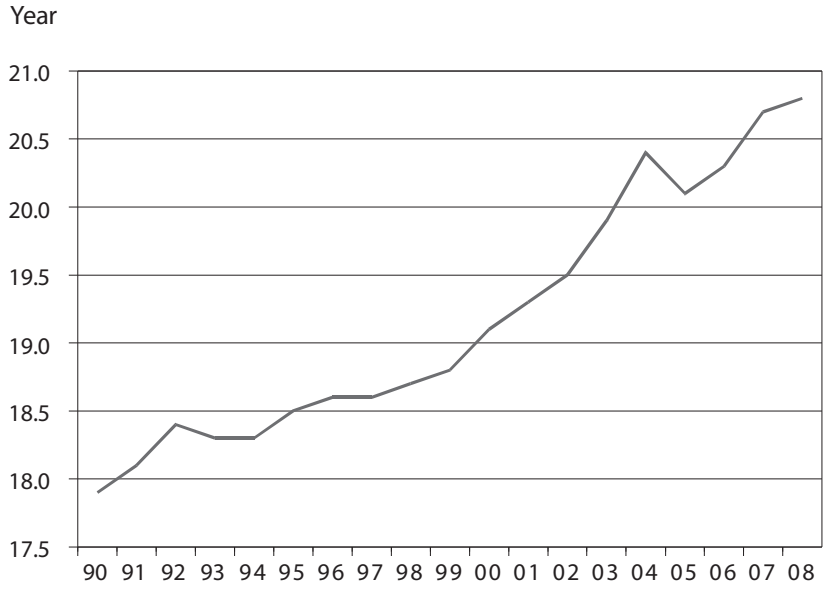
Many factors have contributed to the enormous shortfall currently faced by the state pension systems, and general demographic trends are high on the list. Though they will have a profound and long-lasting impact on state pension liabilities, they are rarely discussed.

Take, for example, the largest state pension system: CalPERS. In June 2010, its Board of Administration approved a proposal that raises the state's contribution by $600 million for FY 2010–2011. Half of the increase is to "adjust for a recent demographic study that found CalPERS retirees living longer and workers retiring slightly earlier."[10]

In California, remaining life expectancy at age 65 has been on the rise. It reached 20.8 years in 2008, an increase of nearly 3 years of lifetime since 1990 (see figure 7). This implies almost two months of longevity gain per year over the past two decades, and this upward trend is likely to continue.

Figure 7. Remaining life expectancy at age 65

California, 1990-2008



Source: California Department of Public Health.

Additionally, according to figures from the California Department of Personnel Administration,[11] the average retirement age was approximately 60 for general state employees and teachers as of 2007. (Public safety employees tended to retire a few years earlier.) If we assume that public employees have on average the same longevity as the general population and their retirement age remains about the same, it implies that state pension payments will have to be made for about 26 years per retiree, or even longer in the future with increasing life expectancy.

10. Press release from the External Affairs Branch, CalPERS (June 16, 2010), http://www.calpers.ca.gov/index.jsp?bc=/about/press/pr-2010/june/board-approves-increase.xml.

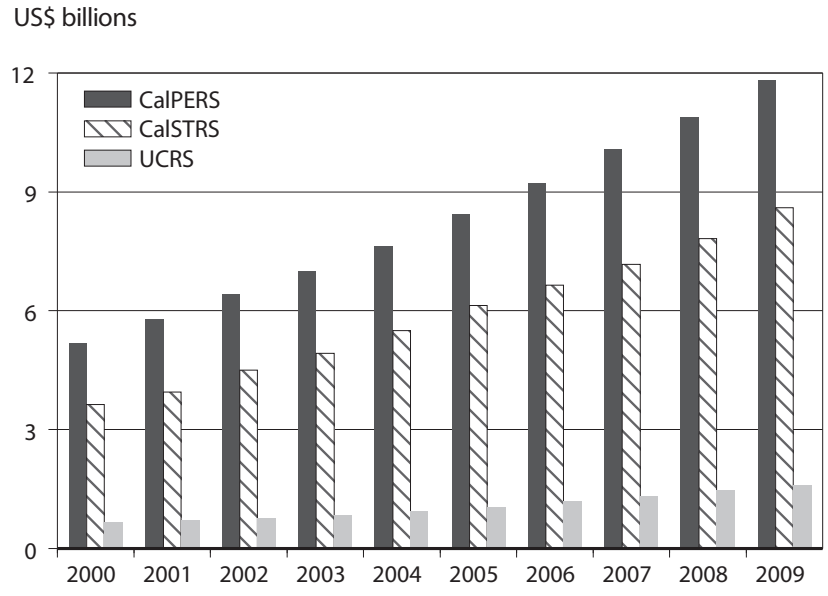
11. http://www.dpa.ca.gov/personnel-policies/workforce-planning/demographics-and-labor-statistics.htm.

However, general state employees and teachers averaged around 25 years of active service as of 2007. Hence, the average state employee may now spend more years receiving benefits than contributing to his or her pension plan. The demographic trend suggests that this discrepancy will grow if the average retirement age is not raised. Pension liabilities will proliferate without commensurate increases in the pension contributions that pre-fund future benefit payments.

The age composition of the state workforce may further worsen state pension liabilities in the foreseeable future. Figure 8 documents the total benefits paid during 2000–2009 by CalPERS, CalsTRS, and UCRS, respectively. For all three pension funds, payments have been increasing over time. As of 2009, the median age of California state employees was within the 45- to 49-year-old age group; 51 percent were classified as baby boomers. Around 37 percent of the state workforce is 50 years old or older, and thus, expected to retire within 10 years. As the workforce ages, there are fewer and fewer active members paying into state pension systems as compared to benefit recipients (including not only retirees but also their survivors and beneficiaries).

Figure 8. Total benefit payments

FY 2000-2009

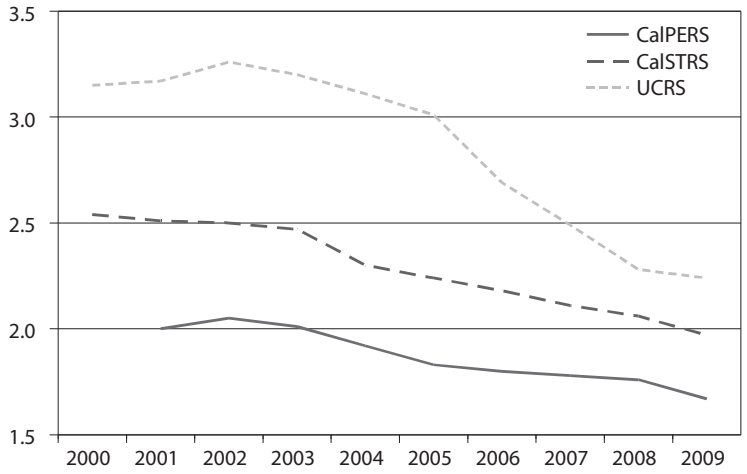


Sources: CalPERS, CalSTRS, and UCRS.

Based on the annual financial reports published by the three major state pension funds, the ratios of active employees to total benefit recipients have been on a steady decline (see figure 9 on the following page). Moreover, according to CalPERS' own projections, the ratio of actives to retirees will decrease even further to 1.05 by year 2050 (Lamoureux 2006). If state pensions remain underfunded or if we encounter future shortfalls, raising employee contributions alone will have a less and less mitigating effect.

Figure 9. Ratio of actives to total benefit recipients

FY 2000-2009*



* The 2000 figure is not available for CalPERS.

Sources: CalPERS, CalSTRS, and UCRS.

California's Lack of Funding Capacity

California's balance sheet presents an ugly picture, and the gap between the state's general fund revenues and expenditures is expected to persist for years to come. According to a report from the Legislative Analyst's Office, "California's Fiscal Outlook," the state's operating shortfall was projected to be $20.7 billion in the current fiscal year, then rise to $23 billion in 2012–2013 before eventually declining to $18.4 billion in 2014–2015. Given the state's fiscal capacity, it is far from viable to count on raising employer contribution to the state pension funds.

A recent task force report projected that the UCRS' unfunded actuarial accrued liability (UAAL) will grow from $2 billion as of 2009 to $19.8 billion in a matter of five years if no corrective actions are taken.[12]

In Table 2, we tabulate ratios of the potential UAAL to official estimates of total state general fund revenue for each of the three major state pension funds, from 2009 to 2014. As no projections of UAAL are available for CalPERS and CalSTRS, we assumed that the annual growth rates of actuarial value of assets and actuarial accrued liabilities would match those of UCRS.[13] Based on our crude projections, sometime around 2012–2013, the combined liabilities of the three major state pension funds will balloon to become more than 5.5 times as large as total state general fund revenue. Notice that this is also the period when the state's operating shortfall is anticipated to reach its peak.

12. UAAL is a method to account for pension payments due in the future at today's value minus today's assets owned by the pension fund. The figure given above does not include the unfunded liability of the UCRS pay-as-you-go retiree health program; when those costs are factored in, the figure more than doubles to $40.4 billion in 2014. Note that CalPERS also offers retiree health benefits that require state contributions. Its defined-benefit post-employment health-care plan (the California Employers' Retiree Benefit Trust Fund) is severely underfunded: The funded ratio was a poor 1 percent in 2008, with a small improvement in 2009. CalSTRS' Teachers' Health Benefits Fund had an even lower funded ratio of 0.4 percent in 2008. Based on the figure reported by the California Public Employee Post-Employment Benefits Commission in 2008, the total state liability of retiree health benefits is at least $118 billion over the next three decades. These types of non-pension post-employment benefits further add to the gravity of the situation (see the 2010 Pew Center report for a nationwide evaluation). The scope of this report, however, will be confined solely to pension liabilities.

13. The Stanford report makes funding projections for each of the three pension funds, but only for one point in time, 16 years into the future. For example, it is estimated that 16 years from now, there is a 61 percent chance that CalPERS will be underfunded by more than $100 billion and a 44 percent chance it will be underfunded by more than $250 billion. Our rudimentary projection puts its unfunded liability at $153.6 billion in year 2014.

Another rough measure of the state's funding capacity is its working-age population. Table 3 tabulates the potential UAAL per working-age adult. With a progressively aging state workforce and a working-age population growing at a slower clip than the senior age cohort, it is no surprise to see that the combined liability per working adult is projected to more than triple, from $3,000+ in 2009 to $10,000+ in 2014.

Table 2. Unfunded state pension liabilities as a percentage of total state general fund revenue

Year	CalPERS	CalSTRS	UCRS	Combined
2009	278.16%	184.25%	2.39%	464.81%
2010	279.01%	184.81%	6.81%	470.64%
2011	297.90%	197.33%	11.39%	506.62%
2012	328.46%	217.57%	17.29%	563.32%
2013	320.48%	212.28%	19.86%	552.63%
2014	312.57%	207.04%	19.96%	539.58%

Sources: UCRS, California Legislative Analyst's Office, California Department of Finance, and authors' own computations.

Table 3. Unfunded state pension liabilities per each working-age adult in California (in US$)

Year	CalPERS	CalSTRS	UCRS	Combined
2009	1908.96	1241.80	81.50	3232.26
2010	2829.45	1852.98	241.86	4924.30
2011	3748.32	2462.79	399.06	6610.17
2012	4785.61	3151.36	578.12	8515.09
2013	5595.22	3688.42	714.30	9997.93
2014	5969.51	3935.90	769.37	10674.78

Sources: UCRS, California Legislative Analyst's Office, California Department of Finance, and authors' own computations.

All in all, the analysis conducted in this section demonstrates that the state of California lacks the resources to make huge infusions into state pension funds. The state government is trapped in its own budget crisis at least in the short-run, and future expenditures for public services and programs are expected to grow to keep up with demographic trends in the short-to-medium run. Moreover, the composition of the state employee pool suggests that state pension liabilities will only grow larger in the forseeable future, while there will be fewer and fewer active workers making contributions relative to the number of benefit recipients.[14]

The takeaway is clear: If state pension shortfalls are not dealt with promptly, the burden facing future state taxpayers will rapidly escalate. Avoiding the issue today will only make it grow in magnitude tomorrow.

14. In a defined-benefit plan, pension benefits are pre-funded by either employee or employer contributions; theoretically, they should be fully funded. But the term "fully funded" is somewhat misleading, since the actual benefit payouts consist not only of these contributions but also of the returns these contributions are expected to generate. So due to investment volatilities and other factors that can reduce assets and increase liabilities, pension funds can become severely underfunded, as they currently are. During market downturns, increased contributions from current employees may be used as an immediate measure to replenish the pension funds.

LONG-TERM SOLUTIONS TO THE DEMOGRAPHIC CHALLENGES

Many studies and reports have proposed various options for tackling the shortfalls and reforming state pension systems. In this paper, we focus on the solutions that address the structural challenges related to California's demographic trends.

There are two general sets of solutions. The first involves implementing feasible adjustments to the current defined-benefit plans, such as increasing contributions, lowering pension benefits, and raising the retirement age. The second solution set is more fundamental: an overhaul of the current pension plan so that investment risks are not entirely borne by the employer but shared with state employees.

Making Adjustments to the Defined-Benefit Plan

Proposed adjustments to the defined-benefit plan usually involve changing pension formulas, which take into account retirement age, tenure, peak- or final-year(s) salary, and the benefit factor (the percentage of salary that a retiree is set to receive for each year of service). While many of these changes can contribute to narrowing the current funding gaps, we believe that two of these immediate measures should be implemented jointly so that state pension funds will be able to cope with California's future demographic trends. These two moves are raising the retirement age and increasing employee contributions. This approach is already being explored, as noted in the two cases below.

Example 1: In June 2010, California Gov. Schwarzenegger and six state employee unions—the Union of American Physicians and Dentists (UAPD), the International Union of Operating Engineers (IUOE), the California Association of Highway Patrolmen (CAHP), the California Department of Forestry Firefighters (CDFF), the California Association of Psychiatric Technicians (CAPT), and the American Federation of State, County, and Municipal Employees (AFSCME)—reached agreements to roll back pension benefits for the duration of their next contract period. All agreements have been signed into law. They require new hires to work additional years before receiving pension benefits, and they also increase employee contributions by 2 to 5 percent for both current and new employees, implying a minimum contribution rate of 10 percent.[15]

On October 6, 2010, the governor struck a similar deal with the Service Employees International Union Local 1000. As of press time, this agreement still awaited ratification by union members and the state legislature.

Notwithstanding the give and take that came with the negotiations, it is estimated that these seven agreements, which also include furlough days that reduce current compensation, will save the state a total of $523 billion in FY 2010-2011.[16]

15. "Gov. Schwarzenegger Signs Legislation Ratifying Union Agreements Including Pension Reform," press release from the Office of the Governor, August 23, 2010, http://www.gov.ca.gov/press-release/15838/.

16. "Gov. Schwarzenegger Announces SEIU Contract with Pension Reforms," press release from the office of the governor, October 7, 2010, http://www.gov.ca.gov/press-release/16144/.

However, while these seven unions represent 132,000 state employees, they constitute merely 16 percent of CalPERS' pension-contributing membership.[17] Hence, these labor concessions may not significantly dent the state pension shortfall. They may, however, set an important precedent as the first steps toward more fundamental pension reform.

Example 2: The University of California Post-Employment Benefits Task Force issued its final report in August 2010 to address the unsustainable unfunded liability faced by the UCRS. Regarding pension benefits, two major recommendations were put forward:

- For new hires, raise both the minimum retirement age and the retirement age at which an employee is eligible to receive the maximum pension benefit by five years.
- Increase both UC and employee contributions, eventually to 10 and 5 percent, respectively.

Analysis

Raising the retirement age—either the minimum retirement age or the age of elibility for full/maxium benefits—encourages prolonged years of services. This is a sensible measure as life expectancy continues to rise, with an average adult's healthy and productive years extended. The obvious advantage of this option is that there will be more years of contributing to the pension plan and fewer years of receiving benefits.[18] However, this advantage comes with a caveat due to the specifications of most retirement formulas.

Take for example the formula for general state employees: 2 percent at age 55.[19] Suppose an employee plans to retire at the age of 55, with 20 years of services and $55,000 as her peak-year salary. She will be entitled to an annual pension of $22,000 (2 percent × 20 years × $55,000). Notice, however, that salary usually grows with tenure—so a later retirement age increases not only the years of service but also the peak-year salary. Gov. Schwarzenegger's pension reform proposal would change the formula to 2 percent at age 60.[20] In his scenario, the same employee might retire five years later. But if her peak salary were augmented by $5,000, she would then receive an annual pension of $30,000 (2 percent × 25 years × $60,000). As a result, while the years of service are increased by 25 percent, the pension benefit is raised by more than 36 percent.[21] Those five additional years of contributions may or may not make up that difference, depending on how long she lives. Hence, in the long term, it is not certain that raising retirement age without making additional adjustments to the benefit formula will bring financial savings to the pension funds. The pattern of salary growth and the demographic trend of the state's workforce should also be taken into account when specifying this policy option.

17. According to CalPERS' latest annual financial report, the PERF received $3.9 billion in employee contributions from 821,113 active members during FY 2008-2009. CalPERS' "Facts at a Glance: Retirement & Membership," dated June 2010, notes that there were 1,626,910 total members as of June 2009 (including 1,134,397 active and inactive members, along with 492,513 retirees, survivors, and beneficiaries receiving monthly allowances). Membership consists of state employees, school employees, and local public agency employees. This document also notes that 78 percent of all service retirees receive $36,000 a year or less, and many do not receive Social Security. Statistics available for download at http://www.calpers.ca.gov/index.jsp?bc=/about/facts/home.xml.

18. See pages 12 and 13, where we report that the average service duration for general state employees and teachers was about 25 years in 2007, whereas the number of benefit-receiving years may already be slightly larger and is expected to increase in the future if the average retirement age remains the same.

19. This formula applies to the California state employees belonging to the retirement category: miscellaneous - first tier. The associated maximum benefit formula is 2.5 percent at age 63+.

20. See http://gov.ca.gov/index.php?/fact-sheet/12836/.

21. As argued in Novy-Marx and Rauh (2009), "[...] the nominal retirement benefit that a worker expects to receive increases more than proportionately with the worker's age."

Finances aside, it is argued that age diversity may raise the total productivity within an organization, through the complementarity between younger and older age groups (Skirbekk 2008). In other words, the longer stay of senior employees has the potential to generate positive spillover effects on the general workforce.

Caution needs to be exercised, however. In the case of public safety workers, who make up much of the CalPERS membership, the physical demands of their jobs will obviously have to be taken into account when making any changes to the retirement age. The same caveat applies to other categories of workers engaged in physical labor.

In addition, for some specific sectors, such as research institutions, prolonging years of services may have unintended consequences. It may reduce the competitiveness of California's higher education system by impacting two key areas: recruitment and the upward mobility of junior researchers in the system. Systematically imposing a longer tenure term for senior researchers throughout the university system may leave the institution with fewer vacant positions. As a result, it may weaken a university's ability to recruit young talent that may replenish the pool of ideas and innovation. In light of California's budget crisis in the last few years, these institutions' core funds for instructional and research activities have already been negatively affected.[22] The UC and Cal State systems have had to trim budgets and impose hiring freezes. Tighter resources and a limited number of vacated senior positions may further erode their ability to elevate and reward productive junior researchers, so it may be more difficult to retain the best talent (Coupé et al. 2005).

Raising the retirement age is more likely to be effective if it is undertaken jointly with an increase in employee contributions. This policy option entails two main advantages. First, as discussed above, delaying retirement may not necessarily imply savings for pension funds in the long term. However, a higher contribution rate during the service years *does* make it more likely that the future pension benefit received is better pre-funded today. Currently, most California state employees already contribute 5 percent or more of their salary toward retirement,[23] a level comparable to the average contribution rate of 6 percent for the private sector's defined-contribution plans.[24]

While asking employees to increase their level of contribution is likely to be met with resistance, there is a sound argument for doing so. The risks involved in the public sector's defined-*benefit* plan are drastically different from those involved in a defined-*contribution* plan, such as the 401(k), which predominates in the private sector. The benefits of state employees are contractually guaranteed, meaning that their contributions enjoy risk-free returns. By contrast, participants in a defined-contribution plan bear all the investment risks. Suppose two individuals have the same salary and roughly the same level of risk aversion, but they participate in different types of plans with similar expected returns. It is only natural for the risk-free plan to require a higher "investment principal," or a higher rate of employee contribution.

The second advantage of increasing contributions from employees is that doing so will bring in much-needed assets immediately and provide a convenient, albeit partial, fix to the current funding gap, which will affect the long-term financial viability of the state pension funds. Nonetheless, as mentioned earlier in this report; the declining

22 Take UC, for instance. In 2009, it reported a $450 million gap in its state funding, which amounted to 15 percent of the total state funding allocated for the UC system.

23. UCRS members, who until recently had not made contributions to their defined-benefit plan for nearly two decades, are an exception.

24. See Munnell and Soto (2007).

ratio of active workers to benefit recipients suggests that over time, the act of increasing employee contributions alone will become less effective in mitigating pension shortfalls. This policy option should serve as a last resort for the purpose of a short-term cash-bailout, since using current employees' contributions to pay for obligations to retirees is simply not sustainable. But when the increased contribution is jointly adopted along with raising the retirement age, it helps to form a long-term strategy that addresses the demographic challenges faced by state pension funds.

Shifting to a Risk-Sharing Plan

All of the primary retirement funds administered by CalPERS, CalSTRS, and UCRS offer defined-benefit plans. As discussed above, this type of plan provides each member with a contractually guaranteed and risk-free pension benefit, with the exact amount calculated using a retirement formula. Even though the benefits are presumptively pre- and fully funded, they are still dependent on generating an adequate level of return over the years with contributions. So market volatility (possibly along with inadequate risk management) can lead to substantial unfunded liabilities. If these are not made up promptly, state taxpayers are left on the hook to eventually pay off the potential debt.

In other words, it is the state of California and its taxpayers who assume the entire investment risk—and ongoing demographic trends suggest an increasing burden per taxpayer in the future if no action is taken.

Several states have adopted risk-sharing retirement plans. Generally this type of plan, similar to a defined-benefit plan, guarantees a basic pension benefit or a minimum rate of return on pension contributions that are risk-free to the employee—but the employees have to bear the investment risks for a portion of their future benefits in the same fashion as a defined-contribution plan.

Example 1: In March 2010, Utah adopted a pension-reform plan that offers new hires a choice of two options: a risk-sharing hybrid plan or a defined-contribution plan. In the hybrid plan, the benefit factor used in the pension formula is lowered to 1.5 percent from the 2 percent specified in the traditional defined-benefit plan;[25] therefore, the *guaranteed* amount of pension benefit is reduced. Moreover, the state contribution is capped at 10 percent of the employee's salary, *regardless of investment outcom*e. During periods of strong market returns, the state may not need to pay 10 percent to cover the required funded ratio, but it will contribute 10 percent anyway, with the surplus being added to the employee's 401(k) account. During market downturns, however, the shortage will be made up for by increasing employee contributions.

Example 2: In 2003, the state of Nebraska established a cash-balance retirement plan as an alternative to the defined-contribution plan. Each plan member has an individual pension account to which both the employer and the employee contribute. Instead of guaranteeing a fixed annual benefit based on pension formulas, Nebraska warrants an "interest credit rate" on the employee's pension account balance. The current minimum rate is set at 5 percent, which is 2-3 percent below the rates of return assumed by the pension funds in California and many other states, thus greatly reducing the likelihood of incurring unfunded liability.[26] In the meantime, Nebraska's state employees may receive dividends in their pension accounts when the investment performs above the minimum rate.

25. Current employees are still covered by the defined-benefit plan with the 2 percent benefit factor.

26. According to the Nebraska Public Employees Retirement System, "In the event of unfavorable investment performance, any additional funds required to provide the guaranteed benefits are to be appropriated from the state general fund."

Analysis

Existing pension plans are contractually guaranteed and protected by statute, so altering the terms requires both concessions from active workers and approval from the state legislature. Thus the shift to a risk-sharing retirement plan, which is a more fundamental change than raising the retirement age or the contribution level, will be more likely to meet political resistance. Therefore it may only be applicable to new hires. Unless *current* state employees can be convinced to adopt a new risk-sharing plan, this policy option will only bear fruit after many years.

Nonetheless, in the long run, it will bring about a more sweeping overhaul than simply making adjustments to the traditional defined-benefit plans currently in place. The latter approach may require periodic modifications; however, it is usually difficult to convince stakeholders to approve the changes needed to address long-term demographic changes in the midst of a bull market, when pension funds enjoy excessive returns. As a matter of fact, the UCRS actually suspended employee contributions in the past two decades due to its overfunding status, which, along with zero employer contribution during the same period, partially contributed to its huge projected pension shortfalls for the coming years if not more.[27]

Moreover, while California's government implicitly assumes the role of guarantor when state pension funds suffer heavy investment losses and risk defaulting on their benefit payments, it is unlawful to channel surpluses of state pension investments back into financing government programs.[28]

Under a risk-sharing plan, this asymmetry will be reduced due to a lower *guaranteed* pension payment or return. Furthermore, it will be possible to retain investment surpluses in the employees' defined-contribution accounts, allowing them to share in any upside. Therefore, in lieu of lowering employee and/or employer contributions because of tentative overfunding, the positive returns on the book may still be exposed to future market fluctuations. The associated reinvestment risks will be borne solely by the employees under a hybrid plan or shared between the employer and employees under a cash-balance plan.

A complete shift toward a defined-contribution plan is likely to meet resistance, but we believe that the adoption of a risk-sharing retirement plan is politically more feasible, for the simple reason that it maintains a defined-benefit component that guarantees at least part of the pension benefit. Many have argued that since salaries are typically lower in the public sector, recruiting good talent depends on the ability to compensate in other ways—by offering a high degree of job security and minimal pension risk. In fact, a relatively secure retirement package often plays an important role in attracting competent workers into state departments and public agencies and institutions. Nevertheless, we believe that a complete lack of pension risk is not an entitlement. A risk-sharing plan would seem to offer a flexible compromise that allows state departments to maintain an effective recruitment practice while still addressing the challenges faced by state pension funds.

Interestingly, the state of Nebraska actually shifted to its cash-balance plan from a defined-contribution plan, not

27. See UC's "Final Report of the President's Task Force on Post-Employment Benefits." In fact, this practice also creates the issue of intergenerational fairness of redistribution. That is, workers employed during periods of strong market gains make low levels of contribution toward retirement, but those employed during market downturns may be required to make high contributions (plus a possible tax hike) in order to cover the pension liabilities owed to former employees.

28. See CalPERS' response to the Stanford Policy Brief on Public Pension Funds at http://www.calpersresponds.com/issues.php/response-stanford-policy-brief.

from a defined-benefit plan. The shift came about after a study found that Nebraska state employees invested so conservatively under a defined-contribution plan that they accumulated far lower pension benefits than those produced by the investments of the defined-benefit teacher fund. If this is a general result and California state pension funds do adopt defined-contribution plans, it might imply that some of the rank-and-file state employees would receive insufficient pension payments and wind up as low-income seniors. In this case, the benefits generated for the state from switching to a defined-contribution plan would be eroded by an increasing demand for the public services such as Medi-Cal and SSI/SSP. This potential scenario adds weight to the argument in favor of a risk-sharing plan.

CONCLUSION

It is in the interest of California's government, state employees, and taxpayers to come together on this issue. We need to identify a politically feasible and fiscally attainable resolution to the huge and expanding funding gap of our state pension systems. Currently, the debate over pension reform has centered on immediate remedies to the present funding shortfall, which was magnified by the funds' investment losses in the 2008–2009 market meltdown. With this paper, however, we would like to apply a longer time horizon to the discussion. In order to formulate a long-term solution, we need to bear in mind the fact that the state pension gap was swelling even during the robust economic growth period of 2003–2007. Hence, the discussion has to be placed in a broader context of the state's economic and demographic trends.

General demographic trends indicate that the demand for public services is not likely to decrease in the foreseeable future; meanwhile, the state budget crisis is expected to persist for many years to come. The state of California simply lacks the fiscal capacity to guarantee public pension payments, particularly given the wave of state employees set to retire in years to come. These structural shifts, coupled with the financial design and the accounting practices of state pension funds, all point to the fact that reform is imperative.

To deal with the challenges facing California's pension funds, we suggest making adjustments to the traditional defined-benefit plan by *concurrently* raising retirement age and increasing employee contributions. Indeed, this approach is already being pursued through the tentative agreements reached by the governor with seven unions in 2010. However, in order to achieve a more fundamental pension overhaul in the long term, it will eventually be necessary to shift to a risk-sharing retirement plan. This move will reduce the asymmetry between the risk of fund investments and the certainty of pension payments, thus decreasing the likelihood of enormous unfunded liabilities. A risk-sharing plan will still provide a fixed, yet lower, amount of guaranteed pension, an important recruiting tool for the state. It should be possible to reduce state liability while still offering a good degree of retirement security for public servants.

Implementing these structural changes will be a difficult task for all stakeholders. State officials and citizens alike have to answer tough questions about how to allocate tax revenues and public resources to make California's future more sustainable. As for the state employees, the changes represent a fundamental shift in thinking about risk-free pensions as an entitlement. These changes are more profound than simply making a technical financial fix. It will require political will and courage to take these steps, and yes, they will involve some painful sacrifices.

The demographics point to one clear conclusion: While the funding gap continues on its current trajectory, further delay is not an option. The pension crisis is beginning to handcuff the state's fiscal and financial planning process, and the situation has to come to a head. Public officials and union leaders will have to find a way to hammer out a realistic and equitable solution, and California's citizens will have to become more engaged in the issues. Once these hurdles have been addressed, state employees will benefit from knowing that the system is on sounder and more sustainable footing—and California can begin balancing its books and investing for the future.

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